WHAT IS CLAIMED IS:

1. A torque sensor comprising:

a first shaft;

a second shaft capable of performing relative rotation, elastically, with respect to said first shaft;

a first alternating signal source which outputs a first alternating signal the phase of which changes in accordance with change in the rotation angle of said first shaft;

a second alternating signal source which outputs a second alternating signal the phase of which changes in accordance with change in the rotation angle of said second shaft; and

an output signal processing section which outputs a phase difference correspondence signal the waveform of which changes in accordance with change in the phase difference between said first alternating signal and said second alternating signal,

wherein said first alternating signal source has a first detector and a first signal processing section;

taking KE as a coefficient, ω as the angular frequency of an excitation signal, t as the time and θ as the rotation angle of the first shaft, said first detector outputs a first sinusoidal amplitude signal expressed by $KE \sin(\omega t) \sin\theta$ and a first cosinusoidal amplitude signal expressed by $KE \sin(\omega t) \cos\theta$, when an excitation signal proportional to $\sin(\omega t)$ is input;

said first signal processing section has a first resistance and a first capacitor connected mutually in series in a circuit which connects the output terminal of said first sinusoidal amplitude signal with the output terminal of said first

cosinusoidal amplitude signal, said output signal processing section being connected to between said first resistance and said first capacitor;

the resistance value of said first resistance and the capacitance value of said first capacitor are set in such a manner that the cut-off frequency becomes said value of ω, when said first resistance and said first capacitor function as a low-pass filter for one of said first sinusoidal amplitude signal and said first cosinusoidal amplitude signal, while functioning as a high-pass filter for the other of said signals,

said second alternating signal source has a second detector and a second signal processing section;

taking KE as a coefficient, ω as the angular frequency of an excitation signal, t as the time and $\theta + \Delta\theta$ as the rotation angle of the second shaft, said second detector outputs a second sinusoidal amplitude signal expressed by $KE \sin(\omega t) \sin(\theta + \Delta\theta)$ and a second cosinusoidal amplitude signal expressed by $KE \sin(\omega t) \cos(\theta + \Delta\theta)$, when an excitation signal proportional to $\sin(\omega t)$ is input;

said second signal processing section has a second resistance and a second capacitor connected mutually in series in a circuit which connects the output terminal of said second sinusoidal amplitude signal with the output terminal of said second cosinusoidal amplitude signal, said output signal processing section being connected to between said second resistance and said second capacitor;

the resistance value of said second resistance and the capacitance value of said second capacitor are set in such a manner that the cut-off frequency becomes said value of ω, when said second resistance and said second capacitor function as a low-pass filter for one of said second sinusoidal amplitude signal and said second cosinusoidal amplitude signal, while functioning as a high-pass filter for the

other of said signals; and

a value corresponding to the torque transmitted by said first and second shafts being determined from said phase difference correspondence signal.

2. The torque sensor according to claim 1, wherein said first detector and said second detector are disposed relatively to each other, in such a manner that the phase difference between said first alternating signal and second alternating signal becomes $\pi/2$ when the torque transmitted by said first and second shafts is zero; and

said output signal processing section has a first logic signal conversion circuit for converting said first alternating signal into a first logic signal; a second logic signal conversion circuit for converting said second alternating signal into a second logic signal; and a PWM processing circuit for outputting a PWM signal corresponding to the exclusive OR of said first logic signal and said second logic signal, as said phase difference correspondence signal.

3. The torque sensor according to claim 1, wherein said output signal processing section has a first logic signal conversion circuit for converting said first alternating signal into a first logic signal; a second logic signal conversion circuit for converting said second alternating signal into a second logic signal; a detection circuit for the rise time of said first logic signal; a detection circuit for the fall time of said second logic signal; and a PWM processing circuit for outputting a PWM signal the rise time of which corresponds to one of either the rise time of said first logic signal or the fall time of said second logic signal, and the fall time of which corresponds to the other thereof, as said phase difference

correspondence signal.